AMENDMENTS TO THE CLAIMS:

This listing of claims replaces all prior versions and listings of the claims in the present application.

Listing of Claims:

1. (Currently Amended) A laser scan type fluorescence microscope comprising:

laser light source section~~,~~;

an objective ~~lens~~ optical system ~~by which~~ constructed and arranged to condense excitation light from the laser light source section ~~is condensed~~ on a sample~~,~~;

a scanning ~~means by which~~ device constructed and arranged to scan a surface of the sample with the excitation light from the laser light source section ~~is scanned on a surface of the sample,~~;

a pupil projection lens arranged between the scanning ~~means~~ device and the objective ~~lens~~ optical system~~,~~; and

a detection optical system for detecting fluorescence ~~which is emanated~~ that emanates from the sample and ~~has penetrated~~ passes the objective ~~lens~~ optical system and the pupil projection lens, ~~and~~

wherein the objective ~~lens~~ optical system ~~further comprising~~ comprises an objective lens and an image forming lens for forming an intermediate image of the sample, wherein a ~~backside~~ back focal position of the objective lens ~~may become~~ is made conjugate ~~at~~ with a position near the scanning ~~means~~ device by the image forming lens and the pupil projection lens, and

wherein the following condition is satisfied:

$$0.15 \leq D/L \leq 0.5$$

where D is a ~~co-focal length~~ parfocal distance of the objective lens, and L is a distance from the ~~sample~~ surface of the sample to the ~~conjugate~~ position ~~of~~ conjugate with the ~~backside~~ back focal position of the objective lens ~~arranged~~ and located near the scanning ~~means~~ device.

2. (Withdrawn - Currently Amended) The laser scan type fluorescence microscope according to claim 1, further comprising an optical transmission ~~means~~ member which leads the excitation light from the laser light source section to the scanning ~~means~~ device.

3. (Currently Amended) ~~The~~ A laser scan type fluorescence microscope ~~according to claim 1,~~ comprising:

a laser light source section;

an objective optical system constructed and arranged to condense excitation light from the laser light source section is condensed on a sample;

a scanning device constructed and arranged to scan a surface of the sample with the excitation light from the laser light source section;

a pupil projection lens arranged between the scanning device and the objective optical system; and

a detection optical system for detecting fluorescence that emanates from the sample and passes the objective optical system and the pupil projection lens,

wherein the objective optical system comprises an objective lens and an image forming lens for forming an intermediate image of the sample,

wherein a back focal position of the objective lens is made conjugate with a position near the scanning device by the image forming lens and the pupil projection lens,

wherein the following condition is satisfied:

$$0.15 \leq D/L \leq 0.5$$

where D is a parfocal distance of the objective lens, and L is a distance from the surface of the sample to the position conjugate with the back focal position of the objective lens and located near the scanning device,

wherein the pupil projection lens ~~consists of two or more~~ comprises a plurality of lens ~~groups~~ components, and is configured so that, of lens surfaces thereof, a ~~concave~~ lens surface ~~of a lens at the~~ arranged nearest ~~side to~~ the scanning ~~means~~ device is ~~directed to the~~ concave toward a scanning ~~means~~ device side~~, concave~~ and a lens surface ~~of a lens at the~~ arranged nearest ~~side to~~ the intermediate image ~~side~~ is ~~directed to the~~ concave toward an intermediate image side, and

wherein the following condition is satisfied:

$$0.2 \leq Fe/D3 \leq 0.5$$

where D3 is a distance from ~~the conjugate~~ a position ~~of the~~ conjugate with a pupil position of the objective lens and located near the scanning ~~means~~ device to a position of the intermediate image ~~position of~~ formed by the image forming lens, and Fe is a focal length of the pupil projection lens.

4. (Currently Amended) ~~The~~ A laser scan type fluorescence microscope ~~according to claim 1, which consists of two or more~~ comprising:

a laser light source section;

an objective optical system constructed and arranged to condense excitation light from the laser light source section on a sample;

a scanning device for scanning a surface of the sample with the excitation light from the laser light source section;

a pupil projection lens arranged between the scanning device and the objective optical system; and

a detection optical system for detecting fluorescence that emanates from the sample and passes the objective optical system and the pupil projection lens,

wherein the objective optical system comprises an objective lens and an image forming lens for forming an intermediate image of the sample,

wherein a back focal position of the objective lens is made conjugate with a position near the scanning device by the image forming lens and the pupil projection lens,

wherein the following condition is satisfied:

$$0.15 \leq D/L \leq 0.5$$

where D is a parfocal distance of the objective lens, and L is a distance from the surface of the sample to the position conjugate with the back focal position of the objective lens and located near the scanning means, and

wherein the laser scanning confocal fluorescence microscope is composed of a plurality of lens groups, ~~and~~ comprises at least one cemented lens having a positive lens element and a negative lens element, and satisfies the following conditions ~~are satisfied~~:

$$0.4 \leq FTL/D1 \leq 1$$

$$80 < \upsilon p$$

where υp is Abbe's number of the positive lens element in the cemented lens, FTL is a focal length of the image forming lens, and D1 is a distance from ~~the position of a~~ an objective lens shoulder ~~of lens~~ on a main body of the microscope to a position of the intermediate image ~~position~~.

5. (Currently Amended) ~~The~~ A laser scan type fluorescence microscope ~~according to claim 1,~~ comprising:

a laser light source section;

an objective optical system constructed and arranged to condense excitation light from the laser light source section on a sample;

a scanning device constructed and arranged to scan a surface of the sample with the excitation light from the laser light source section;

a pupil projection lens arranged between the scanning device and the objective optical system; and

a detection optical system for detecting fluorescence that emanates from the sample and passes the objective optical system and the pupil projection lens,

wherein the objective optical system comprises an objective lens and an image forming lens for forming an intermediate image of the sample,

wherein a back focal position of the objective lens is made conjugate with a position near the scanning device by the image forming lens and the pupil projection lens,

wherein the following condition is satisfied:

$$0.15 \le D/L \le 0.5$$

where D is a parfocal distance of the objective lens, and L is a distance from the surface of the sample to the position conjugate with the back focal position of the objective lens and located near the scanning device, and

wherein the image forming lens ~~consists of~~ comprises two lens groups ~~having~~ that are a front group ~~at the side of~~ arranged on an intermediate image side and a rear group ~~at the side of~~ arranged on an objective lens side, ~~and the lens group of~~ the front group of the image forming lens has at least one negative lens element, and the following conditions are satisfied:

$$0.4 \le D2/FTL \le 1$$

$$0.7 \le FTL1/FTL \le 1.5$$

where FTL is a focal length of the image forming lens, FTL1 is a focal length of the rear group of the image forming lens, and D2 is an interval between the front group of the image forming lens and the rear group of the image forming lens.

6. (Withdrawn - Currently Amended) The laser scan type fluorescence microscope according to claim 1, further comprising:

a first multi-mode fiber which leads the excitation light from the laser light source section to the scanning ~~means,~~ device;

a second multi-mode fiber which leads the fluorescence from ~~a~~ the sample to the detection optical system~~,~~;

a first lens by which entry of the excitation light to the first multi-mode fiber is carried out~~,~~; and

a second lens by which entry of the fluorescence to the second multi-mode fiber is carried out, ~~and~~

wherein the following conditions are satisfied:

$$2 \leq \Phi em/\Phi ex \leq 12$$

$$0.61 \times (\lambda ex/NAex) < \Phi ex$$

$$0.61 \times (\lambda em/NAem) < \Phi em$$

where Φex is a diameter of a core of the first multi-mode fiber, Φem is a diameter of a core of the second multi-mode fiber, NAex is ~~the size of an~~ a numerical aperture ~~by which~~ where entry of the excitation light to the first multi-mode fiber by the first lens is carried out, λex is a wavelength of the excitation ~~wavelength~~ light, NAem is ~~the size of an~~ a numerical aperture ~~by which~~ where entry of the fluorescence to the second multi-mode fiber by the second lens is carried out, and λem is a wavelength of the fluorescence ~~wavelength~~.

7. (Withdrawn - Currently Amended) The laser scan type fluorescence microscope according to claim 1, further comprising an optical transmission ~~means~~ member which leads the fluorescence emanating from ~~a~~ the sample ~~which transmitted through~~ and passing the pupil projection lens to the detection optical system.

8. (Withdrawn - Currently Amended) The laser scan type fluorescence microscope according to claim 1, further comprising ~~an optical transmission means by which~~ a light conducting optical system that leads the fluorescence from the sample ~~is lead~~ to the detection optical system~~, while~~ and leads the excitation light from the laser light source section ~~is led~~ to the scanning ~~means~~ device.

9. (Withdrawn - Currently Amended) The laser scan type fluorescence microscope according to claim 1, further comprising a first optical transmission ~~means~~ member which leads the excitation light from the laser light source section to the scanning ~~means~~ device, and a second optical transmission ~~means~~ member which leads the fluorescence from the sample ~~mentioned above~~ to the detection optical system.

10. (Currently Amended) The laser scan type fluorescence microscope according to ~~claim 1~~ any one of claims 3, 4 and 5, wherein the objective lens is a submerged type objective lens.

11. (Currently Amended) The laser scan type fluorescence microscope according to ~~claim 1~~ any one of claims 3, 4 and 5, wherein the laser light source ~~consists of~~ section includes a semiconductor laser.

12. (Currently Amended) The laser scan type fluorescence microscope according to claim 1, wherein the ~~detector~~ detection optical system is ~~constituted on the~~ arranged in a main body ~~portion~~ of ~~a~~ the microscope.

13. (Withdrawn - Currently Amended) The laser scan type fluorescence microscope according to claim 1, further comprising:

a first multi-mode fiber which leads the excitation light from the laser light source section to the scanning ~~means,~~ device;

a second multi-mode fiber which leads the fluorescence from ~~a~~ the sample to the detection optical system~~,~~;

a first lens by which entry of the excitation light to the first multi-mode fiber is carried out; and

a second lens ~~in~~ by which entry of the fluorescence ~~of~~ to the second multi-mode fiber is carried out,

wherein ~~all of~~ the following conditions are satisfied:

$4 \leq \Phi em/\Phi ex \leq 10$

$0.61 \times (\lambda ex/NAex) < \Phi ex$

$0.61 \times (\lambda em/NAem) < \Phi em$

where Φex is a diameter of a core of the first multi-mode fiber, Φem is a diameter of a core of the second multi-mode fiber, NAex is ~~the size of an~~ a numerical aperture ~~by which~~ where entry of the excitation light to the first multi-mode fiber by the first lens is carried out, λex is a wavelength of the excitation ~~wavelength~~ light, NAem is ~~the size of an~~ a numerical aperture ~~by which~~ where entry of the fluorescence to the second multi-mode fiber by the second lens is carried out, and λem is a wavelength of the fluorescence ~~wavelength~~.

14. (Withdrawn - Currently Amended) ~~The~~ A laser scan type fluorescence microscope comprising:

a laser light source section~~,~~;

an objective ~~lens~~ optical system ~~which condenses~~ constructed and arranged to condense excitation light from the laser light source section on a sample~~,~~;

a scanning ~~means which scans~~ device constructed and arranged to scan a surface of the sample with the excitation light from the laser light source section ~~on the sample surface,~~;

a pupil projection lens arranged between the scanning ~~means~~ device and the objective ~~lens~~ optical system~~,~~; and

a detection optical system ~~which detects~~ for detecting fluorescence ~~emanated~~ that emanates from the sample and ~~transmitted through~~ passes the objective ~~lens~~ optical system and the pupil projection lens~~, wherein it further comprises~~;

a first multi-mode fiber which leads the excitation light from the laser light source section to the scanning ~~means,~~ device;

a second multi-mode fiber which leads the fluorescence from ~~a~~ the sample to the detection optical system~~,~~;

a first lens by which entry of the excitation light to the first multi-mode fiber is carried out~~,~~; and

a second lens ~~in~~ by which entry of the fluorescence ~~of~~ to the second multi-mode fiber is carried out,

wherein ~~all of~~ the following conditions are satisfied:

$$2 \leq \Phi em/\Phi ex \leq 12$$

$$0.61 \times (\lambda ex/NAex) < \Phi ex$$

$$0.61 \times (\lambda em/NAem) < \Phi em$$

where Φex is a diameter of a core of the first multi-mode fiber, Φem is a diameter of a core of the second multi-mode fiber, NAex is ~~the size of an~~ a numerical aperture ~~by which~~ where entry of the excitation light to the first multi-mode fiber by the first lens is carried out, λex is a wavelength of the excitation ~~wavelength~~ light, NAem is ~~the size of an~~ a numerical aperture ~~by which~~ where entry of the fluorescence to the second multi-mode fiber by the second lens is carried out, and λem is a wavelength of the fluorescence ~~wavelength~~.